

**REMARKS**

In the Office Action, claims 4 and 5 are objected to under 37 C.F.R. § 1.75(c) as being of improper dependent form. Claims 1-6 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Skillicorn et al. (U.S. Patent No. 5,077,771) in view of Yahata et al. (U.S. Patent No. 4,734,924).

In this response, Applicants have amended claims 1, 4, and 5 and have canceled claims 2 and 6 without prejudice or disclaimer. Claims 1 and 3-5 are now pending. Applicants traverse the objections and rejections set forth in the pending Office Action, at least for the following reasons.

Applicants have amended claims 4 and 5 so that they are now in proper dependent form. Accordingly, Applicants traverse, and respectfully request reconsideration and withdrawal of, the objections to the claims under 37 C.F.R. § 1.75(c).

Applicants traverse the art-based rejections applied to the pending claims. In this regard, Applicants submit that the applied references do not disclose or suggest any of Applicants' claimed combinations comprising grid voltage control means having cathode current detecting means for detecting a cathode current, wherein, in response to a pulse generated by pulse generating means, said grid voltage control means applies to a first grid electrode a grid operating voltage adjusted such that the cathode current detected by the cathode current detecting means attains a predetermined value when the pulse is in an ON state.

Applicants submit that in Skillicorn et al., for example, a cathode 68 includes a cathode bias resistor network 188 which provides cathode bias operation for tube 44. The resistor network 188 establishes a positive voltage in a range between, e.g., 3 and 15 volts with respect to

ground potential and provides beam current auto-regulation when the electron beam in tube 44 is gated on by operation of the grid element 70 and the focus electrode 72. See Skillicorn et al. at column 10, lines 10-18, for example. However, Skillicorn et al. does not disclose or suggest any of the claimed combinations wherein grid voltage control means applies to the first grid electrode a grid operating voltage adjusted such that the cathode current detected by the cathode current detecting means attains a predetermined value when the pulse is in the ON state. Nor does Yahata et al. make up for this deficiency. Thus, even if these references were to be combined in the manner suggested by the Examiner, the resulting combination would still not include all of the elements in the combinations recited in Applicants' independent claims 1, 4, and 5.

For at least the foregoing reasons, Applicants submit that all of the pending claims patentably distinguish over the applied references to Skillicorn et al. and Yahata et al., whether taken alone or combined in the manner suggested by the Examiner. Accordingly, Applicants respectfully traverse all of the art-based rejections set forth in the pending Office Action and respectfully request reconsideration and withdrawal of all of the objections and rejections set forth therein. As all of the claims are now directed to allowable subject matter, Applicants respectfully request that the Examiner allow all of the pending claims and pass this case to issue.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned "**Version with markings to show changes made.**"

**CONCLUSION**

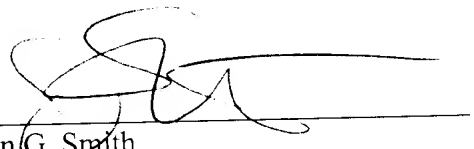
In view of the foregoing, Applicants respectfully request reconsideration and the timely allowance of the pending claims. Should the Examiner feel that there are any issues outstanding after consideration of this response, the Examiner is invited to contact Applicants' undersigned representative to expedite prosecution. A favorable action is awaited.

If there are any other fees due in connection with the filing of this response, please charge the fees to our Deposit Account No. 50-0310. If a fee is required for an extension of time under 37 C.F.R. § 1.136 not accounted for above, such an extension is requested and the fee should also be charged to our Deposit Account.

Respectfully submitted,

**MORGAN, LEWIS & BOCKIUS LLP**

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John G. Smith  
Registration No. 33,818

**CUSTOMER NO. 009629**  
**MORGAN, LEWIS & BOCKIUS LLP**  
1111 Pennsylvania Avenue, N.W.  
Washington, D.C. 20004  
202-739-3000

VERSION WITH MARKINGS TO SHOW CHANGES MADEIN THE CLAIMS

Claims 2 and 6 have been canceled without prejudice or disclaimer.

Claims 1, 4, and 5 have been amended as follows:

1. (Amended) An x-ray generating apparatus comprising:

an x-ray tube for generating, within a housing sealed into vacuum, an x-ray by focusing an electron emitted from a cathode into an anode target by way of a first grid electrode, a second grid electrode, and a focusing electrode;

grid voltage control means for controlling a grid voltage applied to said first grid electrode; and

pulse generating means for generating a pulse which changes from an OFF state to an ON state and ~~[keeps]~~ maintains said ON state for a predetermined period of time;

wherein said grid voltage control means ~~[applies]~~ has cathode current detecting means for detecting a cathode current and, in response to said pulse generated by said pulse generating means, applies a cutoff voltage to said first grid electrode when said pulse is in said OFF state so as to prevent said electron emitted from said cathode from reaching said anode target, and applies to said first grid electrode, in response to said pulse generated by said pulse generating means, a grid operating voltage adjusted such that said ~~[electron emitted from said cathode so as to bombard said anode target]~~ cathode current detected by said cathode current detecting means attains a predetermined ~~[amount of quantity]~~ value when said pulse is in said ON state.

4. (Amended) An x-ray imaging apparatus comprising imaging means for capturing an x-ray transmission image formed upon irradiating an object to be inspected with an x-ray generated by ~~the~~ an x-ray generating apparatus ~~{according to claim 1;~~  
};

wherein said x-ray generating apparatus comprises:

an x-ray tube for generating, within a housing sealed into vacuum, an x-ray by focusing an electron emitted from a cathode into an anode target by way of a first grid electrode, a second grid electrode, and a focusing electrode;

grid voltage control means for controlling a grid voltage applied to said first grid electrode; and

pulse generating means for generating a pulse which changes from an OFF state to an ON state and maintains said ON state for a predetermined period of time;

wherein said grid voltage control means has cathode current detecting means for detecting a cathode current and, in response to said pulse generated by said pulse generating means, applies a cutoff voltage to said first grid electrode when said pulse is in said OFF state so as to prevent said electron emitted from said cathode from reaching said anode target, and applies to said first grid electrode, in response to said pulse generated by said pulse generating means, a grid operating voltage adjusted such that said cathode current detected by said cathode current detecting means attains a predetermined value when said pulse is in said ON state; and

wherein said imaging means receives said pulse generated by said pulse generating means and captures said x-ray transmission image when said pulse is in said ON state.

5. (Amended) An x-ray inspection system comprising ~~the~~ an x-ray generating apparatus ~~[according to claim 1,]~~, an x-ray imaging apparatus having imaging means for capturing an x-ray transmission image formed upon irradiating an object to be inspected with an x-ray generated by said x-ray generating apparatus; and object detecting means for detecting arrival of said object in an imaging area in said x-ray imaging apparatus;

wherein said x-ray generating apparatus comprises:

an x-ray tube for generating, within a housing sealed into vacuum, an x-ray by focusing an electron emitted from a cathode into an anode target by way of a first grid electrode, a second grid electrode, and a focusing electrode;

grid voltage control means for controlling a grid voltage applied to said first grid electrode; and

pulse generating means for generating a pulse which changes from an OFF state to an ON state and maintains said ON state for a predetermined period of time;

wherein said grid voltage control means has cathode current detecting means for detecting a cathode current and, in response to said pulse generated by said pulse generating means, applies a cutoff voltage to said first grid electrode when said pulse is in said OFF state so as to prevent said electron emitted from said cathode from reaching said anode target, and applies to said first grid electrode, in response to said pulse generated by said pulse generating means, a grid operating voltage adjusted such that said cathode current detected by said cathode current detecting means attains a predetermined value when said pulse is in said ON state;

wherein said pulse generating means has trigger signal outputting means for outputting a trigger signal according to said detection of said object by said object detecting means and outputs said pulse when said trigger signal is outputted from said trigger signal outputting means; and

wherein said imaging means receives said pulse outputted from the pulse generating means and captures said x-ray transmission image when said pulse is in said ON state.